DOCUMENT RESUME

ED 039 140 SE 008 357

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TITLE	Individually Prescribed Instruction, Implication, Procedures, Interest.
INSTITUTION	Smedley Ungraded School, Springfield, Pa.
PUB DATE	3 Apr 70
NOTE	13p.; Paper Presented at Annual Meeting of National Council of Teachers of Mathematics (Washington, D.C., April 1-4, 1970)
EDRS PRICE	EDRS Price MF-$0.25 HC-$0.75
DESCRIPTORS	Curriculum Development, *Individualized Instruction, *Instruction, Instructional Materials, *Mathematics Education, *Ungraded Elementary Programs
IDENTIFIERS	National Council of Teachers of Mathematics

ABSTRACT

A program designed to manage instruction so that each student's work can be evaluated daily with specially designed assignments for each student is described in this report. By means of placement tests, pre-testing, and highly sequenced behavioral objectives, the teacher can prescribe for each student in the class according to his needs. The program also provides for individual diagnosis of skills and abilities by the teacher. In this way the teacher spends most of his time in a 1-1 situation and lecturing to the class is held to a minimum. This program, Individually Prescribed Instruction (IPI), was initiated at the Learning, Research and Development Center at the University of Pittsburgh in 1963 and is now in its seventh year of operation. Presently, approximately 100 schools are participating in this program. (FL)

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I N D I V I D U A L L Y

P R E S C R I B E D

I N S T R U C T I O N

X

Implications, Procedures, Interest

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IMPLICATIONS

PROCEDURES

INTEREST

As years go, we are sometimes prone to name them according to an event. As an example, 1970 may well be remembered as the year of the eclipse; 4668, the year of the dog; 1969, the beginning of the age of Aquarius. I would take some license now in renaming this year as 1970... the year of the IPI.

IPI, Individually Prescribed Instruction, is a system of managing instruction so that each child's work can be evaluated daily with a specially tailored assignment for each student. The system is now in its seventh working year. I mention "working" because actual ground work was laid in 1963 when a feasibility study was initiated at the University of Pittsburgh, (The Learning, Research and Development Center), for use in the Baldwin-Whitehall School, Oakleaf. The project was replicated in five other pilot schools in the summer of 1966.

THE FIRST I - IMPLICATIONS

Research for Better Schools, Inc., a regional lab, was funded under Title IV, E.S.E.A., 1965 (Research Contract O.E.C. 1-7-062867-3053) and ushered in a new era of teaching/learning capabilities in that teachers could now, because of highly sequenced behavioral objectives and placement instruments, prescribe for each and every child in the class according to his needs, based upon an accurate starting point for each child.

Historically speaking, education began as an individual process - pupils in the one-room school houses were instructed individually by the teacher. A particular feature of such education was that such instruction was for but a

select few. As numbers grew, groupings evolved and individual teaching, with few exceptions, fell by the wayside.

The Learning, Research and Development Center, University of Pittsburgh, has currently adopted those types of materials which are suitable for an individualized approach known as IPI. The works of Drs. Glaser, Bolvin, and Lindvall, (LRDC) were paramount in the development of IPI.

As a result of this effort, Individually Prescribed Instruction is based on a carefully sequenced list of behavioral objectives grouped into units of different levels at a highly independent level.

Another aspect of the program is the provision for individual diagnosis of skills and abilities by a professional teacher, doing what she can best do - diagnose and prescribe a specific lesson for a specific child in a pupil oriented lesson.

The teacher continues to play the most important part in the learning situation - but there are certain changes in her makeup. She learns that

1. Lecturing to a group is at a minimum.
2. She works with 30 individuals when she has 30 in her class.
3. Most of her time is spent in a 1-1 situation.
4. There are frequent planning sessions where much sharing of ideas transpires.

THE MIDDLE P - PROCEDURES

To accomplish the above, she avails herself of a series of diagnostic instruments used in IPI. These are

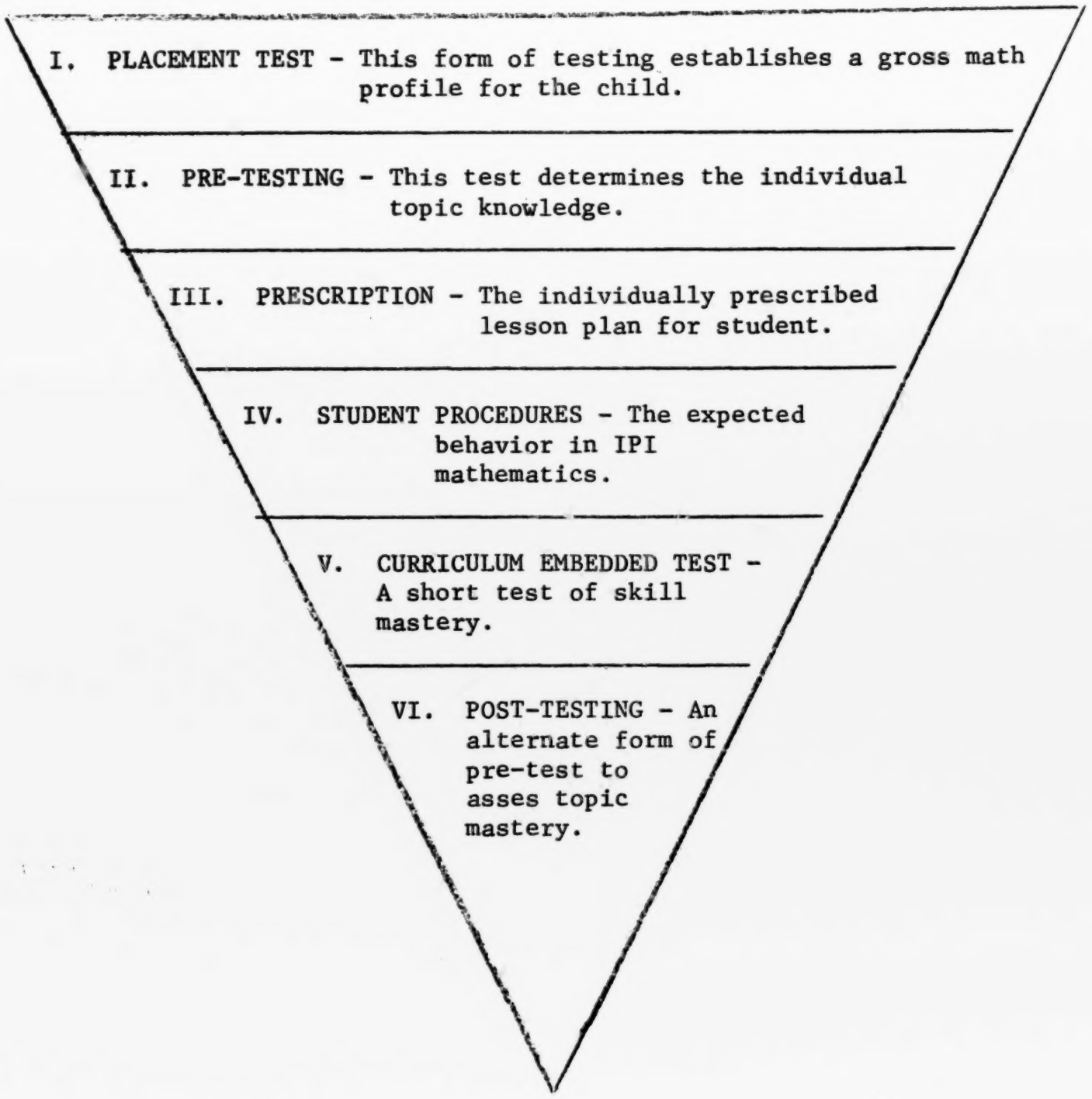
1. Placement Test: A gross profile which indicates mastery along units of the continuum.

2. Pre-Test: Determines the specific objective within a unit which the student does/does not know; measures each specific objective within a level and unit; considered as an entry behavior for each objective within a level and unit of work.

3. Post Test: An alternate form of pre-test to determine mastery for each unit.

4. Curriculum Embedded Test (CET): A short test on progress toward a particular objective within a level and unit of work. There are two parts - part one determines his progress toward a particular objective and part two serves as a short pre-test of his ability to achieve at the next higher objective.

IPI PROCEDURES


I. PLACEMENT TEST - This form of testing establishes a gross math profile for the child.
II. PRE-TESTING - This test determines the individual topic knowledge.
III. PRESCRIPTION - The individually prescribed lesson plan for student.
IV. STUDENT PROCEDURES - The expected behavior in IPI mathematics.
V. CURRICULUM EMBEDDED TEST - A short test of skill mastery.
VI. POST-TESTING - An alternate form of pre-test to asses topic mastery.

INDIVIDUALLY PRESCRIBED INSTRUCTION

IPI PROCEDURES, MATH

Henry J. Papiernik

All schooling, and particularly as it involves individualization, has always had as its primary goal, the intent of teaching a child where he is and helping him to continue from that point. Therefore, it would seem that the requirements of a successful system would be the diagnosis of what children already know.

I. PLACEMENT PROCEDURES

Individually Prescribed Instruction has attempted to indicate such knowledge by a series of tests which indicate the math levels of each child. A battery of tests called "Placement Tests" has been designed to determine the gross knowledge of a child in math. These tests develop a profile for each student from which a teacher is able to correctly ascertain prior knowledge of the student. Such placement testing occurs only once, upon entry into the program. The following placement profile is offered as an example:

STUDENT--JOHN KUBINSKI

UNIT TOPICS	A	B	C	D	E	F	G	(Levels of Learning)
Numeration	X	X						
Place Value	X	X	X	X				
Addition	X	X	X					
Subtraction	X	X	X	X				
Multiplication	X	X	X					
Division	X	X	X	X	X	X		
Combinations of Processes	X	X	X	X				
Fractions	X	X	X	X	X	X		
Money	X	X	X	X	X	X		
Time	X	X	X	X	X	X		
Systems of Measurement	X	X	X	X	X			
Geometry	X	X	X	X	X			

The above tests indicate that the youngster has mastered Numeration through level B and Place Value through level D. He has mastered Addition through level C, Subtraction through level D, Multiplication through level C, etc. This indicates that he is ready and able to start working at Numeration level C; Place Value at level E and Addition at level D.

II. PRE-TESTING

In the next area, Pre-Testing, we are able to analyze the mastery of specific objectives within a unit topic. In this example, we are analyzing the specific objective within the topic of Numeration. Please look at the

lower right boxed area of the Prescription blank. The pre-testing indicates the student had 85% mastery in skills 1, 2, 3, and 4. The Learning, Research and Development Center of the University of Pittsburgh considers mastery at 85%. Skills 5 and 6 are below mastery at 33% and 67% respectively.

An analysis of skill 5 indicates that pages 3,5,8,9 and 11 are to be prescribed as shown below:

PRE AND POST TEST SCORES

SKILL NUMBER	MAX POINTS PER SKILL	PRE SCORE	%	POST SCORE	%	POST SCORE	%	POST SCORE	%
1	10	10	100						
2	10	10	100						
3	9	9	100						
4	6	6	100						
5	6	2	33						
6	6	4	67						
DATES									

Skill 5, pp. 3,5,8,9,11

OBJECTIVE, SKILL 5

Page 3
Fills in missing numerals, counting by 5's

Page 5
Counts backwards by 5's with number line

Page 8
Counts backwards/ forwards by 5's

Page 9
Counts backwards/ forwards by 5's, from 190-195

CET I

These pages are then prescribed for the student. PRESCRIBED??? Yes, each child receives an individual lesson plan from his teacher, as needed. She reviews his progress during the day and indicates to him the next area in which he is to work. In determining his readiness to continue, we hope to achieve an 85% level of understanding, but teacher judgment may preempt this figure on individual cases and it may be a considerably lower figure, based on teacher judgment. The teacher then writes, "C NUMERATION, 5 & 6" in the unit area near the top of the page.

III. THE PRESCRIPTION (Rx)

The prescription now takes form. The teacher begins the prescription on an analysis of the individual student's pre-test as indicated above. On the first line of the prescription blank, she will print:

DATE PRES.	PRES. INIT.	SKILL NO.	PAGE NO.	TOTAL POINTS	NO. CORRECT	INST. TECH. CODES
Jan20	JS	5	3			01
			5			
			8			
			9			
Jan21	JS	CETS	11			

Date prescribed: January 20; Prescriber's initials: JS Skill #: 5
Page Numbers: 3,5,8,9,11 of the selected IPI Standard Teaching Sequence

Upon completion of the first prescribed work-sheet, page 3, the work is scored either by an aide, or, if a student is capable, by himself. The usual time of such scoring and correcting is about three or four minutes. This student, John Kubinski, had 22 correct answers out of a possible 22 problems. On line 2, Prescription Blank, you will notice that he scored 21 of a possible 25. When he corrects these errors, a teacher will review his method of correction and satisfied, she will then place a check mark (✓) in the "Score" column next to 21. Instant feedback is thus available.

TASKS						
DATE PRES.	PRES. INIT.	SKILL NO.	PAGE NO.	TOTAL POINTS	NUMBER CORRECT	INST. TECH CODES
Jan20	JS	5	3	22	22	01
			5	25	21 ✓	
			8	34	30 ✓	
			9	49	45 ✓	
Jan21	JS	CETS	11			

As John completes some of his work, he places a 3 x 5 name card in front of one of the IPI aides. This indicates that he has some work to be scored. He returns to his desk and continues to work until the aide calls his name. When his name is called, he has his paper checked, scored and the aide initials his Prescription blank with J.O. (June O'Hea). When his work indicates probable mastery, a Curriculum-Embedded Test (CET) is prescribed. (See prescription, line 5)

TASKS								CURRICULUM TEST				DAYS WORKED
								PART 1		PART 2		
DATE PRES.	PRES. INIT.	SKILL NO.	PAGE NO.	TOTAL POINTS	NO. CORRECT	INST. TECH. CODES	INSTRUCTIONAL NOTES	NO. OF POINTS	%	NO. OF POINTS	%	
Jan20	JS	5	3	22	22	01						JO
				25	21 ✓							JO
				34	30 ✓							JO
				49	45 ✓							JO
Jan21	JS	CETS	11					23	88	15	60	JO

Each CET contains part 1--a comprehensive test of the skill, and part 2--a short introduction to the next skill which may indicate a degree of mastery. In this case, the student scored 23 points (88%) on part 1; on part 2, he scored 15 points (60%). The CET score of 60% was expected based on the pre-test score of 67%. When such additional teaching is required as indicated by the 60%, any one of the already mentioned instructional techniques may be used. On successful completion of the assigned work, he is given a post-test, an alternate form of pre-test which examines topic mastery. When such mastery is definite, he moves to the next weak area on the pre-test, and the cycle begins anew.

Instructional techniques are also prescribed when a teacher feels that special assistance is required for the student. In this case, the teacher decided that the best technique would be "01" tutor. She assists the child along those certain lines required by him. At another time, she might assign a student tutor (02), a small group instruction, film strips, disc record, etc. For the complete list of instructional techniques, please see the lower left corner of the prescription blank.

IV. STUDENT PROCEDURES

Students are encouraged to develop an independent attitude and you may see a small group of children, working in the same general topic, move to one corner of the room and discuss solutions to some of the common problems. At least once a week, a seminar is held in which problems of mutual concern are discussed by the children. Grade lines are crossed frequently and there is fruitful discussion by all concerned. In the course of most IPI work, film strips, film loops, record discs and manipulative aids are always in evidence and easily operated by the children.

Prior to beginning in his math assignment, the student receives his folder from his teacher. In it are included his prescription blank, previous work and work to be done. Most third and fourth grade children are capable of selecting their own math materials (worksheets, film strips, record discs, all sorts of manipulative aids), as prescribed by the teacher. Some first and second grade children also share in the prestige of "pulling their own prescription," but most younger students rely on the assistance of an IPI aide. If, after receiving his folder, he still does not understand what to do, the student seeks assistance from a teacher by raising a three dimensional "flag" made of construction paper on his desk. He continues working on other parts of his assignment until the teacher arrives. Frequently, because he has had time to think ahead, he is apt to tell the teacher, "I figured it out by myself."

ipi MATHEMATICS PRESCRIPTION SHEET

WEST

Kubinski, John — STUDENT NAME

0 0 6 1 — STUDENT NUMBER

9 0 5 0 1 — SCHOOL NUMBER

3 — GRADE

102 — ROOM

C-Numeration, Skills 5 & 6 — UNIT

UNIT DATES	
UNIT BEGAN	
UNIT ENDED	
DAYS WORKED	

TASKS								CURRICULUM TEST				DAYS WORKED
								PART 1		PART 2		
DATE PRES.	PRES. INIT.	SKILL NO.	PAGE NO.	TOTAL POINTS	NUMBER CORRECT	INST. TECH CODES	INSTRUCTIONAL NOTES	NO. OF POINTS	%	NO. OF POINTS	%	
Jan20	JS	5	3	22	22	01						JO
			5	25	21 ✓							JO
			8	34	30 ✓							JO
			9	49	45 ✓							JO
Jan21	JS	CETS	11					23	88	15	60	JO

INSTRUCTIONAL TECHNIQUES	
CODE	SETTING
01	Teacher Tutor
02	Peer Tutor
03	Small Group
04	Large Group
05	Seminar
MATERIALS	
06	Curr. Texts
07	Teacher Made Skillsheets
08	Film Strips
09	Records/Tapes
10	Research
12	Manipulative Devices

PRE AND POST TEST SCORES									
SKILL NUMBER	MAX POINTS PER SKILL	PRE SCORE	%	POST SCORE	%	POST SCORE	%	POST SCORE	%
1	10	10	100						
2	10	10	100						
3	9	9	100						
4	6	6	100						
5	6	2	33						
6	6	4	67						
DATES									

Based upon prototype originated by the Learning Research and Development Center. As Field tested by Research for Better Schools, Inc.

P1 — 1969

APPLETON-CENTURY-CROFTS
DIVISION OF MEREDITH CORPORATION
440 Park Avenue South, New York, N. Y. 10016

THE LAST I - INTEREST

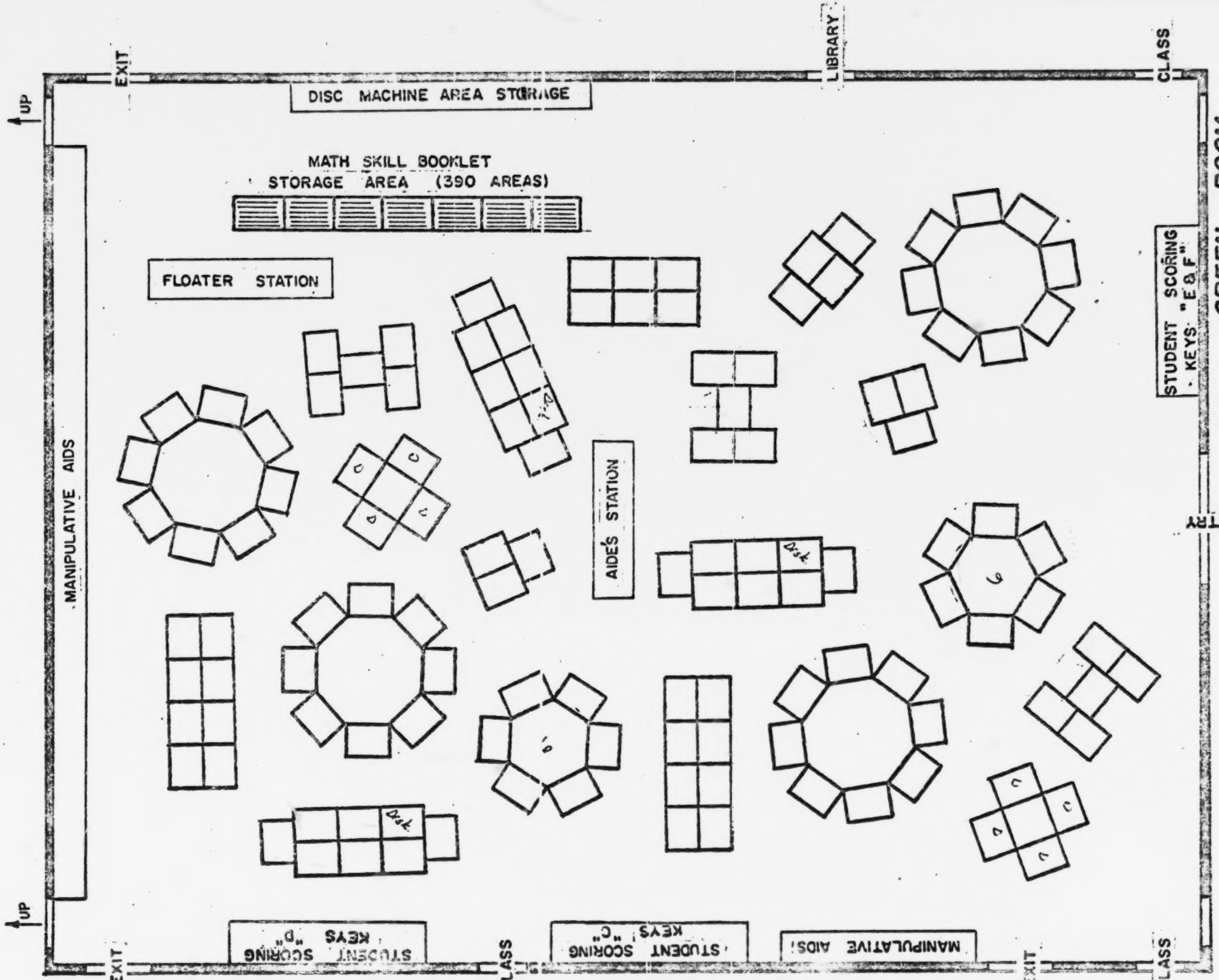
During the school year, 1967, five pilot schools in the tri-state areas of Pennsylvania, Delaware and New Jersey were selected for field development in mathematics. These were Harrisburg, Baldwin-Whitehall, and Quakertown, Pennsylvania, as well as Trenton, New Jersey and Dover, Delaware. In the next year, this number was increased to 26 schools, spanning the continent. Presently, there are 50,000 students, 2,500 teachers, and approximately 100 schools. Plans for the coming year indicate a total population spanning 14 countries and 75,000 students.

In addition, the impact of IPI has been felt by institutions of higher learning. The interest has initiated a need for small group dynamics, tutorial instruction, individual progress diagnosis, prescription writing, child psychology, child behavior, learning patterns, and testing and measurement. Certainly, if future teachers are to be trained in the IPI philosophy, it would seem obvious that veteran experienced teachers must also undergo some training experiences. Most logically, teachers are asked to participate in a summer workshop. The best training seems to occur when a new teacher is associated with an experienced teacher for a short period of time. Special materials have been designed by Research for Better Schools, Inc., to permit the individualization of teacher training. These same procedures are suitable for training of the IPI aide who will score the student's work, thereby freeing a teacher to evaluate the work scored.

Presently, there are refinements in the system and research designed to lower the cost of the program to the point where it is hoped that IPI can be placed in any conventional school at a reasonable cost in the near future.

GREEN ROOM

SEATING CAPACITY 123 STUDENTS



GLOSSARY OF IPI TERMS

1. INDIVIDUALLY PRESCRIBED INSTRUCTION

   An instructional system which attempts to adapt learning to the needs of the individual.

2. CONTINUUM

   The sequence of behavioral objectives outlining the curriculum.

3. UNITS

   Subdivisions of the mathematics, reading, or science program. For example, there are thirteen specific units comprising the mathematics continuum. These include numeration, place value, addition, subtraction, multiplication, division, combination of processes, fractions, money, time, systems of measurement, geometry, and special topics.

4. BEHAVIORAL OBJECTIVES

   Stated instructional goals in terms of the behavior that one desires the learner to demonstrate.

5. PLACEMENT TESTS

   The diagnostic instruments which assess mastery for each unit of work and provide a gross profile of any student along the learning continuum.

6. PRE-TEST

   The diagnostic instrument which measures the student's strengths and weaknesses in his progress toward each objective within the level and unit of work. It can be considered the entering behavior of the student for each objective and helps to determine the learning tasks.

7. POST-TEST

   This instrument is an alternative form of the pre-test and is assigned at the end of each unit of work to determine mastery.

8. CURRICULUM-EMBEDDED TEST

   This short test provides specific data on mastery of each specific objective within the learning continuum. It provides a limited pre-test of the following objective within a level and unit of work.

9. LEVELS

   A way of categorizing the difficulty of the objectives within the continuum with A being the simplest and 1 the most difficult.

10. PRESCRIPTION

    A plan for an individual to improve and master a particular objective or skill on the learning continuum.